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EFFECTS OF OXIDANT LEVELS ON SELECTED HEALTH CHARACTERISTICS OF PERSONS IN THE LOS ANGELES BASIN-FIRST ANNUAL REPORT, VOLUME I. DATA COLLECTION

R. David Flesh

Copley International Corporation

Prepared for:

Environmental Protection Agency
Coordinating Research Council, Incorporated

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FIRST ANNUAL REPORT

VOLUME I: DATA COLLECTION

Prepared for the

Coordinating Research Council
Thirty Rockefeller Plaza
New York, New York 10020
under Contract No. CAPM-11-71

Environmental Protection Agency
Research Triangle Park
North Carolina 27711
under Contract No. 68-02-0349

By

Copley International Corporation
7817 Herschel Avenue
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This volume covers the progress achieved by Copley International Corporation (CIC) in performing its project responsibilities; (1) to measure selected health characteristics of persons residing in three communities of the Los Angeles Basin; (2) critiques of the data collection and (3) analysis procedures designed by the EPA for the performance of the CHESS studies.

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Asthmatics
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Copley International Corporation gratefully acknowledges the cooperation of many private citizens of the Los Angeles Basin who gave generously of their time by participating in the studies described in this report. Without their whole-hearted cooperation, this report would not have been possible.

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Copley International Corporation is especially grateful to Dr. Robert C. Chapman of the Environmental Protection Agency for his counsel and assistance in the conduct of the study.

The work upon which this report is based was performed pursuant to Contract No. CAPM-11-71 with the Coordinating Research Council and Contract No. 68-02-0349 with the Environmental Protection Agency.

CONTRIBUTIONS

The overall responsibility of this study was undertaken by Mr. R. David Flesh, Director, Environmental Economics, Copley International Corporation. Others who contributed to this report included: Mmes. Marian O. Doscher, Senior Industrial Economist; Elizabeth M. Roberts, Industrial Economist; and Linda E. Hanson and Victoria A. Jones, Manuscript Typists.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS AND CONTRIBUTIONS	i
LIST OF TABLES	iii
LIST OF FIGURES	iv
INTRODUCTION	1
OUTLINE OF THE STUDIES	2
Studies Already Undertaken	2
Studies to be Undertaken Soon	7
STUDY LOCATIONS	7
HEALTH DATA COLLECTION UNDERTAKEN	10
Preliminary Tasks	10
Study I - Chronic Respiratory Disease (CRD)	10
Study III - Acute Respiratory Disease (ARD)	15
Study IV - Pulmonary Function in Children (PFT)	17
Study VII - Symptom Variation in Asthmatics	21
AIR MONITORING FACILITIES	26
Equipment	26
Operation	27
CONCLUDING COMMENTS	27
APPENDIX	

LIST OF TABLES

Table		Page
1	Key population characteristics of the study locations	8
2	Numbers of School and Family Health Questionnaires distributed and corresponding response rates	14
3	Number of interviews completed by decision of family	15
4	Numbers of families who agreed to participate by priority category	16
5	Number of ARD families chosen to participate, by group	17
6	Numbers of children tested during the first round of PFT	18
7	Numbers of children tested during the second round of PFT. . .	21
8	Numbers of children tested during the third round of PFT. . . .	21
9	Number of asthmatics identified from those who completed and returned the School and Family Health Questionnaires . . .	23
10	Number of interviews completed by decision of candidate	23
11	Comparison of interview methods used in recruiting asthmatics.	24
12	Numbers of asthmatics chosen as panelists and the numbers of panelists remaining after 19 weeks of participation.	25

LIST OF FIGURES

Figure		Page
1a	Schedule of tasks performed - 1972	3
1b	Schedule of tasks performed - 1973	5
2	Los Angeles metropolitan area - urban portion (map)	9
3	Covina	11
4	Garden Grove	12
5	Thousand Oaks	13
6	Sample pulmonary function test report	19
7	Sample pulmonary function test team quality check sheet	20
8	Photograph of child participating in pulmonary function test	22
9	Air monitoring shelter	28
10	Particulate sampling devices	29
11	Interior view of shelter	30

EFFECTS OF OXIDANT LEVELS ON SELECTED HEALTH CHARACTERISTICS OF PERSONS IN THE LOS ANGELES BASIN

FIRST ANNUAL REPORT
VOLUME I: DATA COLLECTION

INTRODUCTION

In March 1972, Copley International Corporation was awarded contracts by the Coordinating Research Council (CAPM-11-71 (1-71)) and the Environmental Protection Agency (68-02-0349) to participate in a coordinated series of epidemiologic studies planned for the Los Angeles Basin. These studies form a part of the Community Health and Environmental Surveillance System (CHESS) program being conducted in several various sized metropolitan areas across the nation. They are designed to be performed under standardized procedures to measure simultaneously sensitive health and environmental quality indicators in sets of communities representing exposure gradients to common air pollutants such as oxidants. The purpose of these studies, and of the CHESS program as a whole, is to permit an evaluation of existing environmental standards and, in light of new health intelligence obtained, to develop new standards and improved understanding of the effects of air pollutants on human health.

CIC's primary responsibility under the awarded contracts is to measure selected health characteristics of persons residing in three communities of the Los Angeles Basin. Simultaneous measurements of ambient air characteristics in the same communities is the responsibility of the Statewide Air Pollution Research Center, University of California, Riverside, under a separate contract with the Environmental Protection Agency. Additional CIC responsibilities include critiques of the data collection and analysis procedures designed by the EPA for the performance of the CHESS studies and of the Federal Intramural Technical Reports in which the subsequent data analysis performed by the EPA is described.

This volume covers the progress achieved by CIC in performing its project responsibilities during the first contract year. It is divided into five sections: an outline of the studies already undertaken and those to be undertaken, a description of the study locations, the details of data collection surrounding the studies already undertaken, a description of the supporting air monitoring facilities, and concluding comments. Volume II, to be published at a later date, describes the subsequent data analysis performed by the EPA.

OUTLINE OF THE STUDIES

CIC participated in four separate studies during the first year of the awarded contracts and will participate in three additional studies during the second contract year. Brief descriptions of the studies, along with statements of the hypotheses to be tested, are given in the following subsections.

The study numbers were assigned by CIC in connection with the preparation of a project work plan and time schedule, the latter of which is reproduced below (Figure 1).

Studies Already Undertaken

Study I - Prevalence of Chronic Respiratory Disease (CRD).

Description: Development of information using School and Family Health Questionnaires.

Hypothesis: People living in high pollution communities experience greater prevalence of chronic respiratory disease than those living in low pollution communities.

Study III - Incidence of Acute Respiratory Disease (ARD).

Description: Development of information through biweekly telephone interviews with 275 families per community.

Hypothesis: Families living in high pollution communities experience greater incidence of acute respiratory disease than those living in low pollution communities.

Study IV - Pulmonary Function in Children (PFT).

Description: Use of $FEV_{0.75}$ as indicator measure.

Hypothesis: Children living in high pollution communities have poorer ventilatory performance than children living in low pollution communities.

Study VII - Symptom Variation in Asthmatics.

Description: Development of information through completion of diaries by 75 asthmatics per community.

The Effects of Oxidant Levels on Selected Health Characteristics
of Persons in the Los Angeles Basin Area

1972

Schedule of Tasks Performed

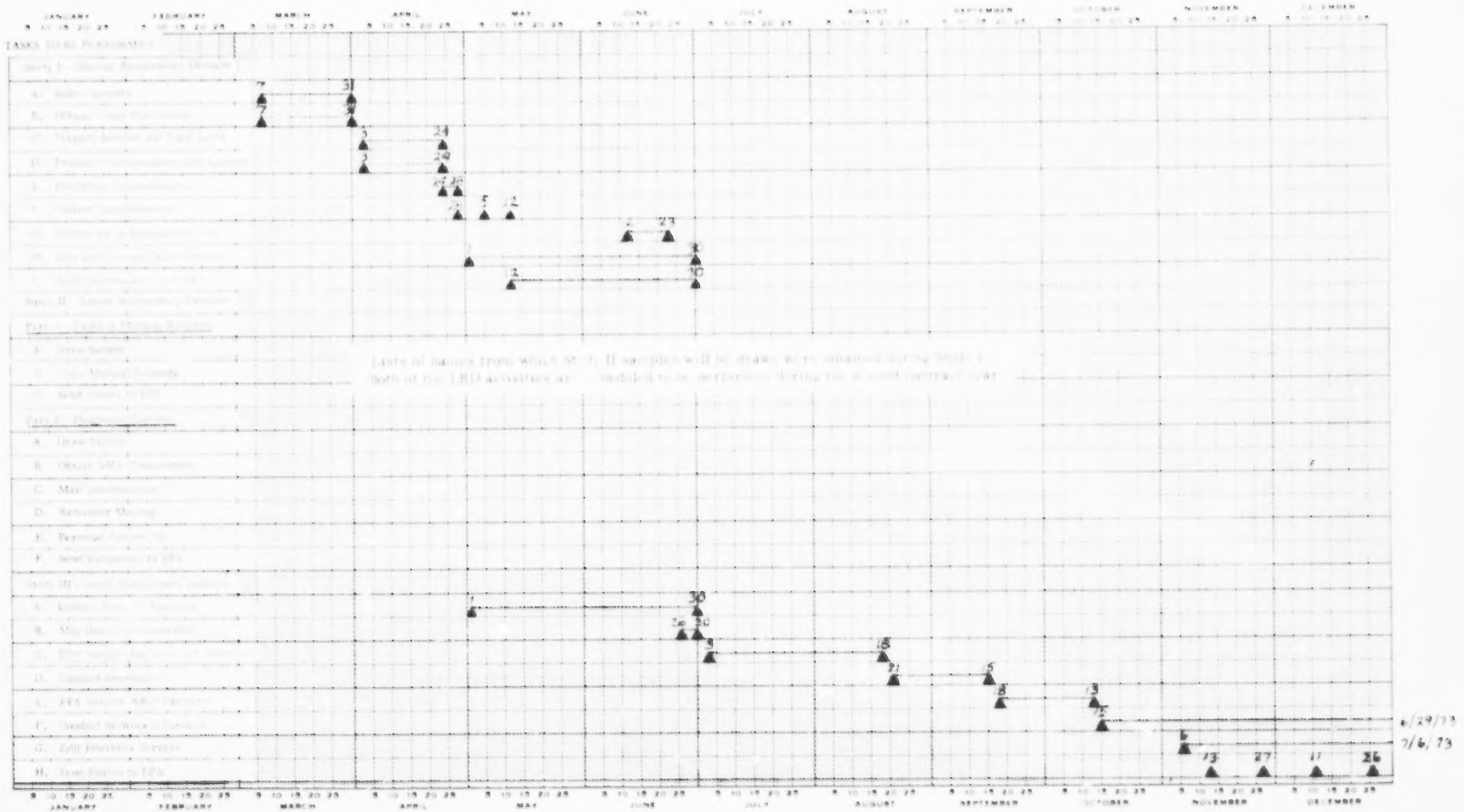


Figure 1a. (continued)

The Effects of Oxidant Levels on Selected Health Characteristics
of Persons in the Los Angeles Basin Area

1972

Schedule of Tasks Performed

Copley International Corporation

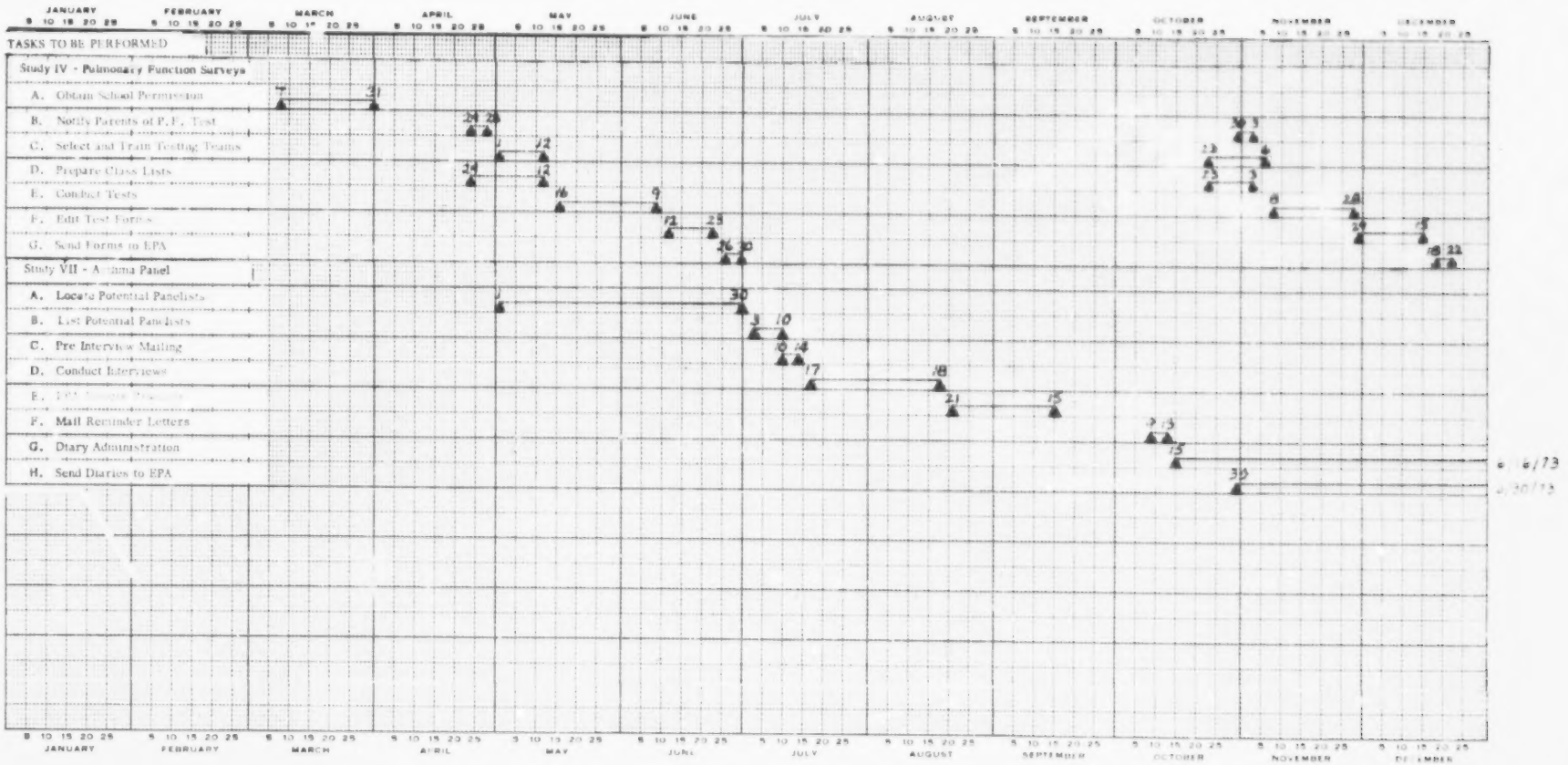


Figure 1b.

The Effects of Oxidant Levels on Selected Health Characteristics
of Persons in the Los Angeles Basin Area

1973

Schedule of Tasks to be Performed

Copley International Corporation

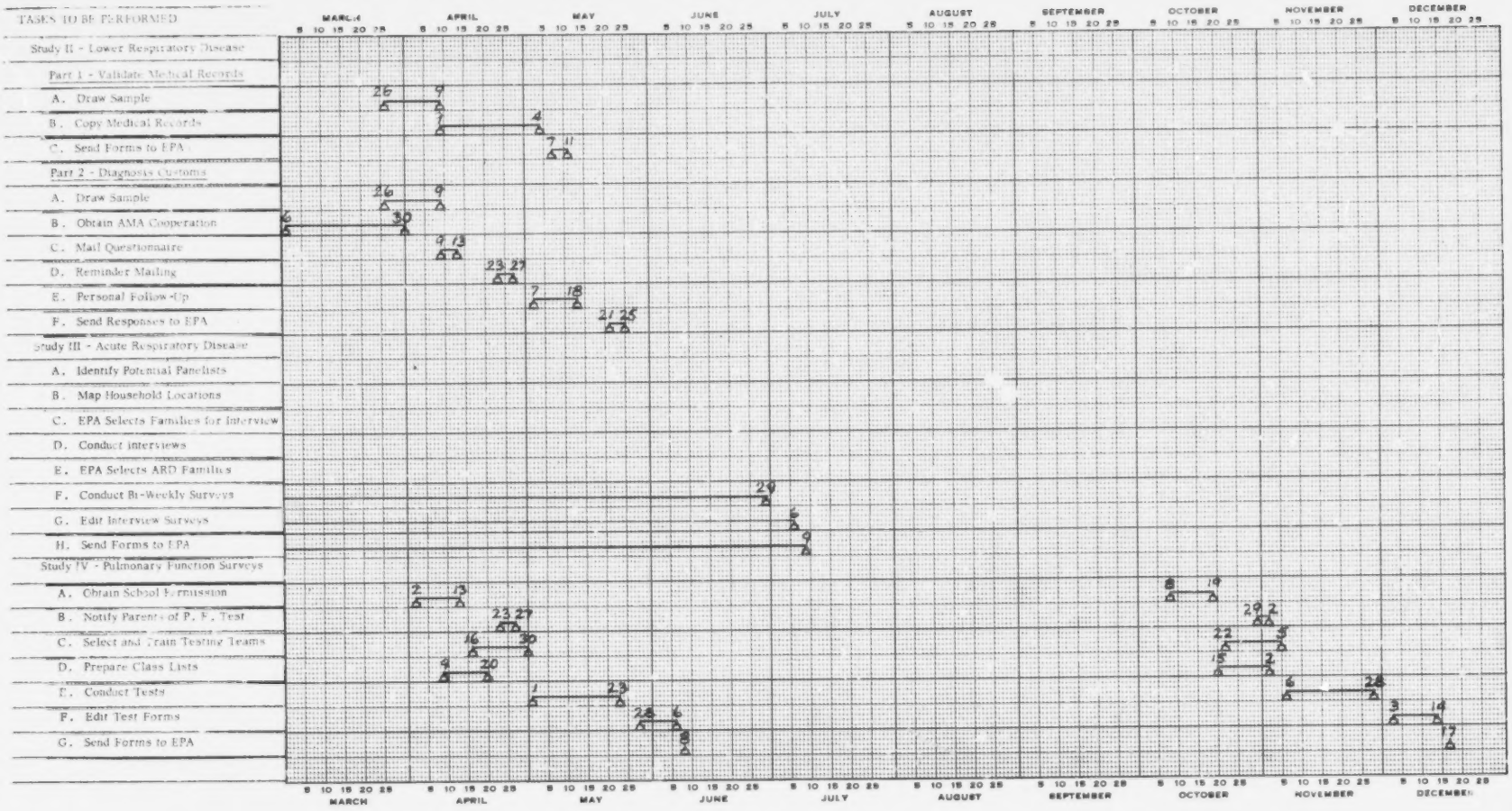


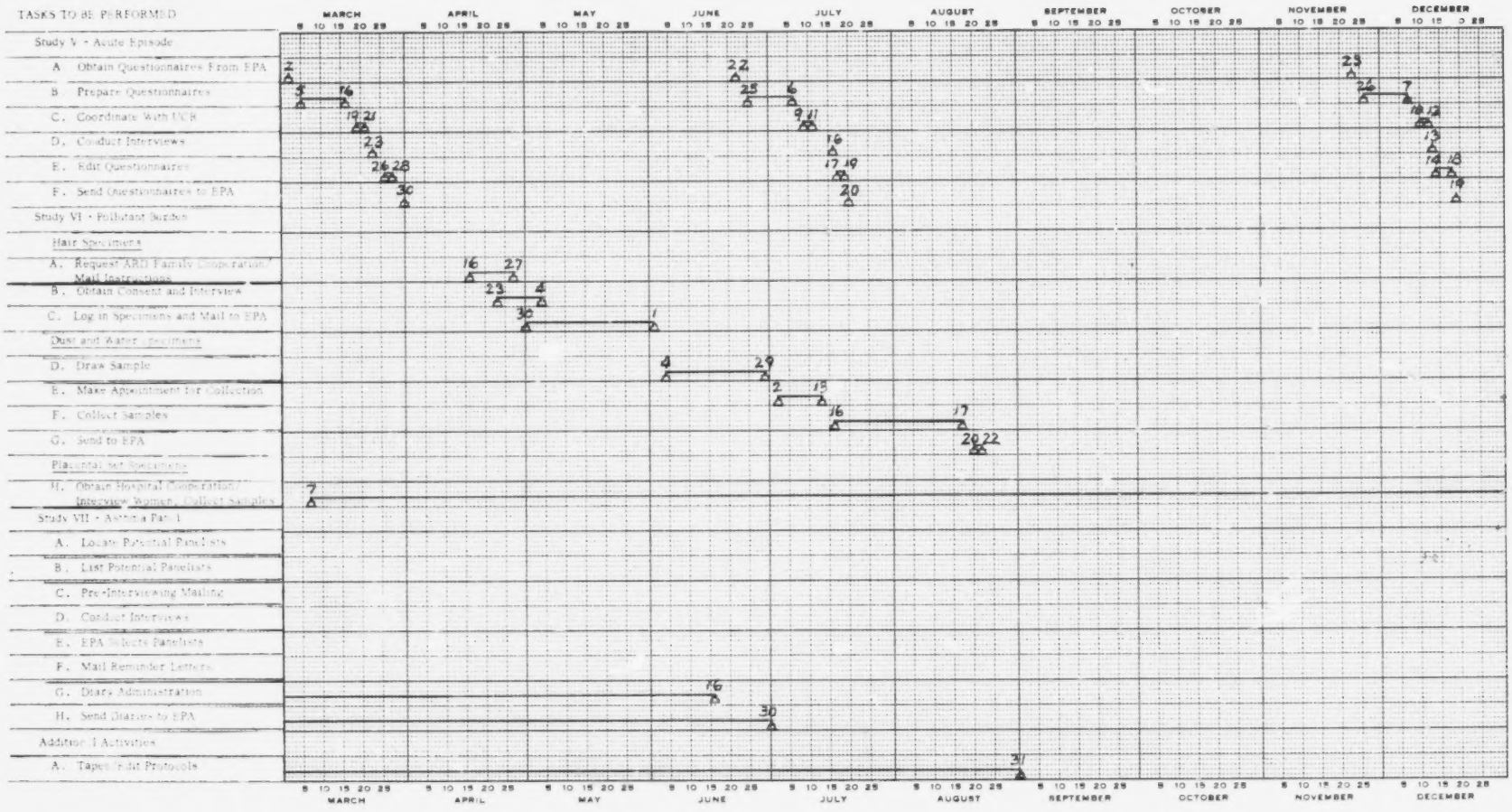
Figure 1b. (continued)[1]

The Effects of Oxidant Levels on Selected Health Characteristics
of Persons in the Los Angeles Basin Area

1973

Schedule of Tasks to be Performed

Copley International Corporation



Hypothesis: Susceptible subjects living in high pollution communities experience greater incidence or more severe asthma attacks than those living in low pollution communities.

Studies to be Undertaken Soon

Study II - Prevalence of Lower Respiratory Disease (LRD).

Description: Validation of information obtained from School and Family Health Questionnaires by reference to medical records and determination of diagnostic customs.

Hypothesis: Air pollution is a contributory cause of increased incidence or severity of pneumonia, croup, bronchitis, and other deep chest infections among children.

Study V - Incidence of Irritative Symptoms During Acute Episodes.[1]

Description: Development of information through coordinated telephone interviews with ARD families.

Hypothesis: There is a significant increase in irritative symptoms during elevations of air pollution levels.

Study VI - Pollutant Burden of Trace Metals.

Description: Collection of hair, tap water, and household dust from ARD families. Collection of 25 maternal-fetal sets per CHESS community.

Hypothesis: The body burden of trace metals closely parallels environmental exposure to metals concentration.

STUDY LOCATIONS

The first step leading to the conduct of the studies was the selection of communities representative of a pollutant gradient. Tentative communities were

[1] The term "Episodes" is used as an epidemiologic term for CHESS study purposes and not as indicating critical values for regulatory or health warning purposes.

selected in 1971 by the EPA with reference to published information about maximum oxidant concentrations, climatic variations, and population characteristics. Evaluations of these communities were then performed by measuring ozone at temporary sites in the tentative communities. Based on the results of these evaluations, three communities were chosen as permanent study locations. They are listed below according to pollutant gradient designation:

- High oxidant community: Covina, California.
- Intermediate oxidant community: Garden Grove, California.
- Low oxidant community: Thousand Oaks, California.

In April 1972, an air monitoring station was erected in support of the CHESS program under the direction of the EPA in each of the selected communities. The maintenance of these stations in accordance with EPA procedures is the responsibility of the University of California, Riverside. During the first month of station operations, daily maximum hourly average concentrations of ozone were found to meet the national primary photochemical oxidants air quality standard 31 percent of the time in Covina, 46 percent in Garden Grove, and 63 percent in Thousand Oaks. Based on these further results, the choice of the three communities as representative of a pollutant gradient appears to be satisfactory.

As can be seen in Figure 2, the three communities form a rough geographic triangle of the following intercity mileage distances:

- Thousand Oaks to Covina: 65 miles
- Covina to Garden Grove: 35 miles
- Garden Grove to Thousand Oaks: 75 miles

As mentioned above, population characteristics were also considered by the EPA in the choice of communities. The comparability of those selected is demonstrated by the following information taken from Bureau of the Census reports:

Table 1. Key population characteristics of the study locations.

Characteristic	Covina	Garden Grove	Thousand Oaks
Population	30,380	122,524	36,334
White race (%)	98.1	97.9	98.4
No. of families	7,794	30,817	8,849
No. of persons per family	3.9	4.0	4.1
Median family income ($)	11,958	11,793	14,071
Median age (years)	27.4	24.9	23.9
Median no. of years of school completed	12.4	12.4	12.7

Sources: Bureau of the Census, 1970 General Population Characteristics, Final Report PC (1)-B6, and 1970 General Social and Economic Characteristics, Final Report PC (1)-C6.

Figure 2.

LOS ANGELES
METROPOLITAN AREA
URBAN PORTION
Thousand Oaks
15 miles
Covina
Garden Grove
Pacific Ocean
Burbank
Pasadena
Glendale
Monrovia
Azusa
Glendora
San Dimas
Baldwin Park
West Covina
Pomona
Claremont
Whittier
La Habra
Norwalk
Fullerton
Placentia
Yorba Linda
Anaheim
Buena Park
Santa Ana
Tustin
Westminster
Torrance
Compton
Inglewood
Hawthorne
Lakewood
Long Beach
Rolling Hills
San Pedro
Sierra Madre
NATIONAL FOREST

It is noted that Covina has a slightly older population, while Thousand Oaks has a slightly wealthier population. In general, however, all three communities can be described as being white, middle-income. It is further noted that the use of such communities places a constraint on the projection of the project results. However, such a constraint is justified in the establishment of a baseline against which any complexities arising from ethnic or income factors can be judged later.

HEALTH DATA COLLECTION UNDERTAKEN

Preliminary Tasks

Initial tasks included a critique of the EPA procedures for the performance of the CHESS program, and the selection of clusters of elementary schools within each CHESS community. The review considered the adequacy and internal consistency of the documents for use in obtaining and processing health data. In general, the procedures were found adequate to produce the information needed to satisfy the purpose of the study. However, an additional constraint underlying most of the procedures was recognized as the method for choosing respondent families. Because of reliance on elementary schools as the vehicle for contacting potential respondents, the study findings cannot be said to represent the entire populations of the CHESS communities. Instead, the results will reflect the effects of oxidants on families having elementary school children. Ample justification for this constraint would exist if it can be held that such families or the elementary school children of such families are among the most sensitive to exposure to oxidants.

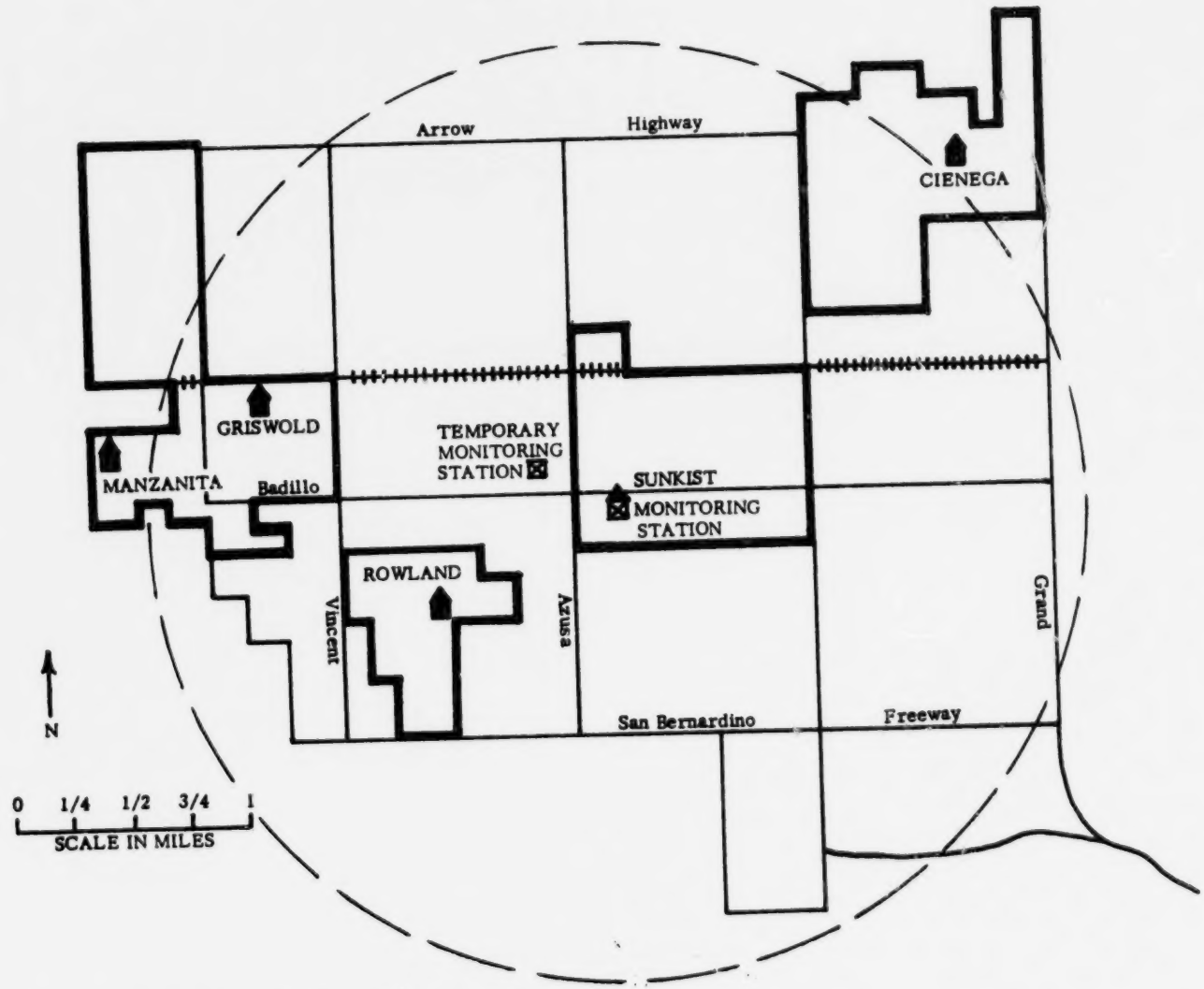
An attempt was made to locate the air monitoring station in each CHESS community centrally with respect to the local school district boundaries and well away from specific sources of possible air pollution, such as industrial plants and freeways. Formal requests were made to school district boards of education for their cooperation and permission to conduct the study in elementary schools nearby the air monitoring stations. In each case, the school boards were very cooperative and quickly granted permission allowing the studies to be conducted in accordance with the schedule of Figure 1. The locations of the air monitoring stations and the elementary schools used in connection with the following studies are shown in Figures 3, 4, and 5.

Study I - Chronic Respiratory Disease (CRD)

The purpose of this study is to develop a cross-sectional comparison of the prevalence of chronic respiratory disease symptoms from information solicited from approximately 1,000 families in each community. Background information and an enumeration of pertinent symptoms was solicited by means of School and Family Health Questionnaires, an example of which is appended to this report. Estimating an average of two elementary school children per family,

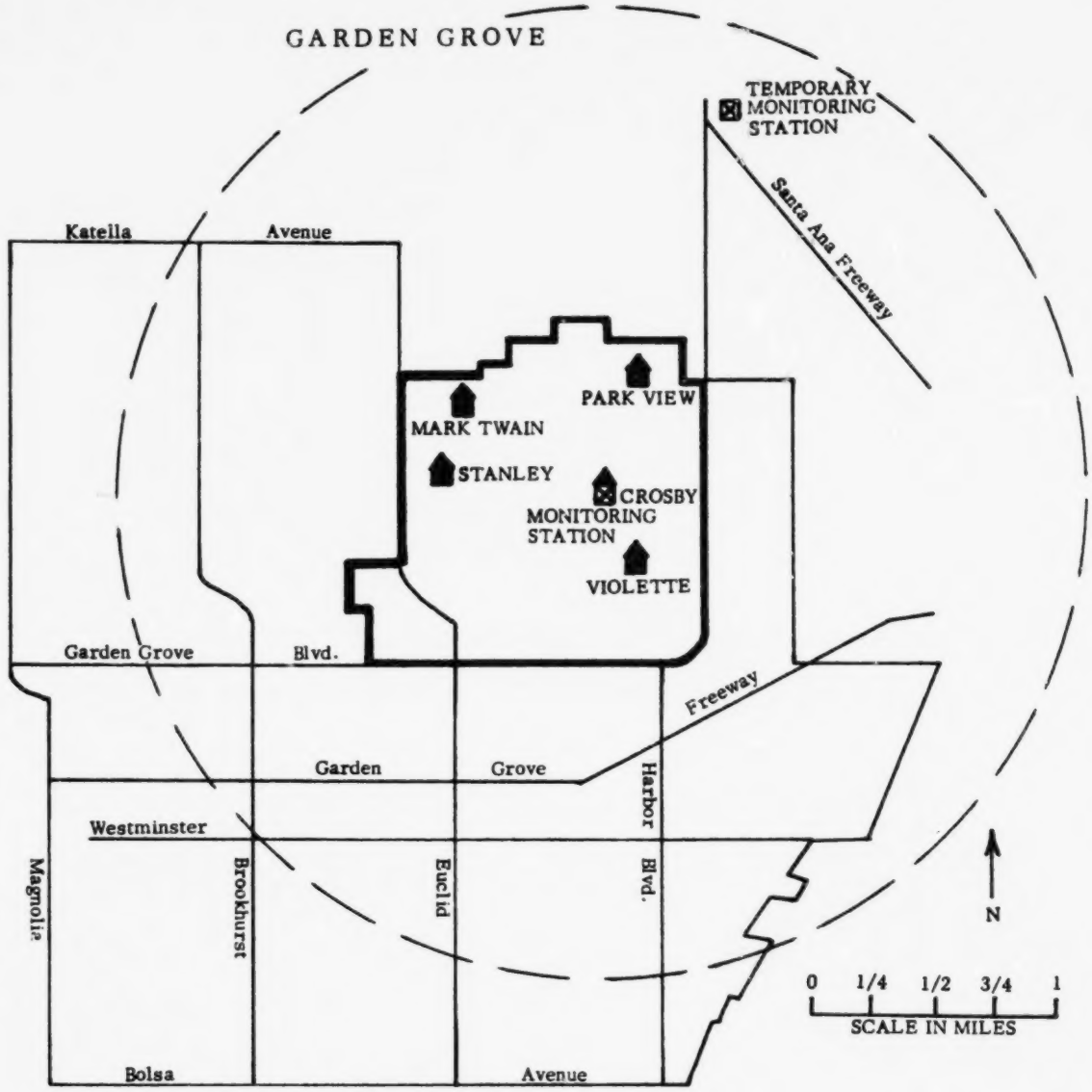
Figure 3.

COVINA



Source: University of California, Riverside.

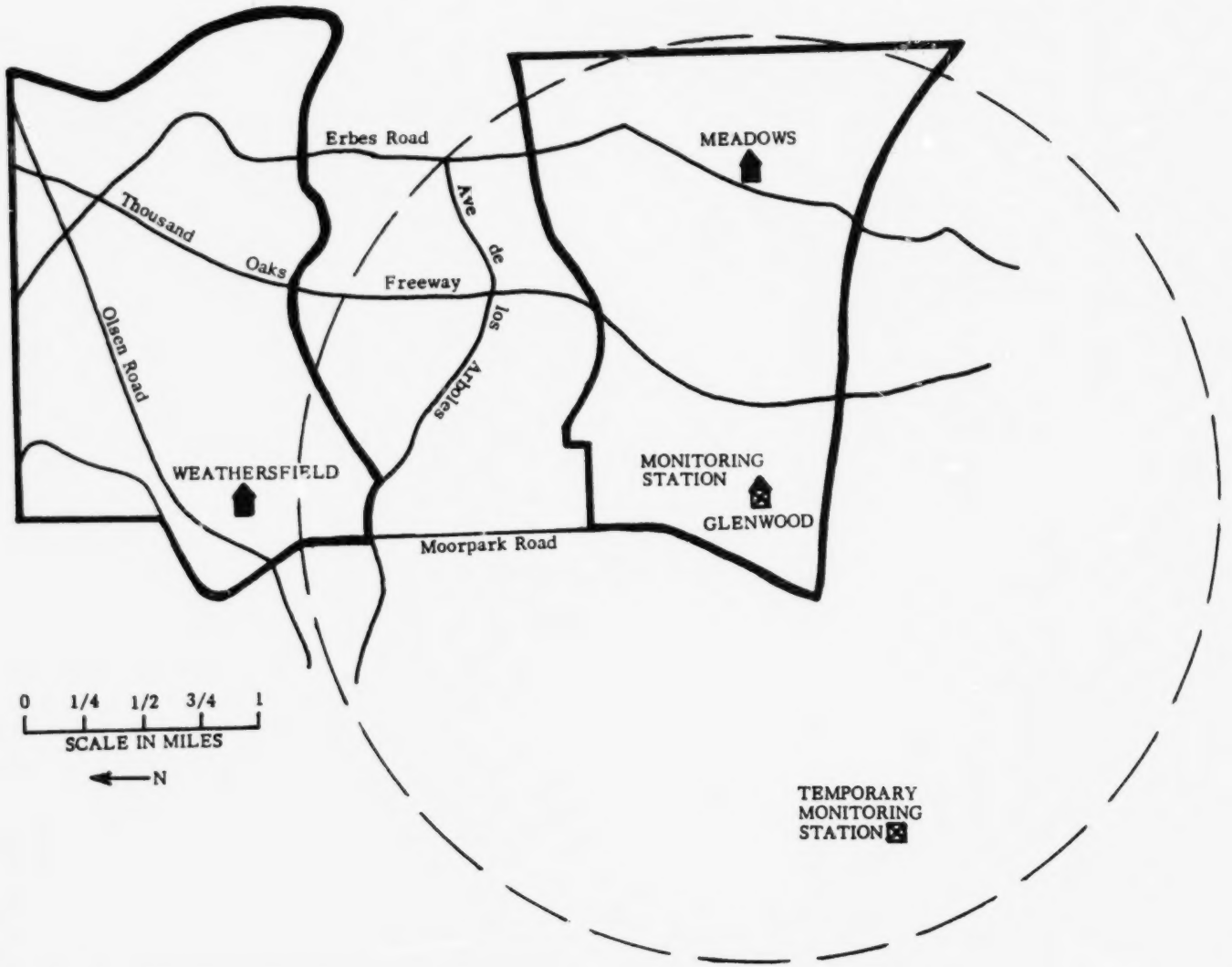
Figure 4.



Source: University of California, Riverside.

Figure 5.

THOUSAND OAKS



Source: University of California, Riverside.

as shown in Figure 2, the questionnaires were distributed through a cluster of elementary schools having an enrollment of approximately 2,000 students in each community. The distribution took place during the last week of April 1972.

Table 2. Numbers of School and Family Health Questionnaires distributed and corresponding response rates.

Community	No. of Schools Used	Enrollment as of Jan. 1972	No. of Questionnaires Distributed	Total Response Rate*
Covina	5	2,148	1,395	87%
Garden Grove	5	2,147	1,456	85
Thousand Oaks	3	1,950	1,219	88

*Includes questionnaires completed by families and returned to schools plus telephone interviews completed with non-respondent families.

The number of questionnaires distributed and the percentage returned to each school is given in Table A of the Appendix.

In Garden Grove and Thousand Oaks the questionnaires were sent home with the youngest child of each family having one or more children enrolled in the eight schools used. This was possible, since CIC was able to identify the youngest children from the records of each school. However, this procedure could not be used in Covina, since CIC was not granted access to enrollment information. Consequently, in Covina the questionnaires were sent home with all children in attendance during the week of the distribution. The parents of these children were asked simply to return all duplicate questionnaires to the schools.

In accordance with the data collection procedure, telephone interviews were conducted with 100 families having children enrolled in the Garden Grove schools and a like number of families having children enrolled in the Thousand Oaks schools. The families were selected from those who did not return the questionnaires. The results of these interviews increased the response rates from 82 percent and 83 percent, respectively, to those shown above. The response rate for the Covina schools had to be estimated.

Editing and coding of returned questionnaires was undertaken in May 1972. The processing was divided into five subtasks in order to permit the editors to change activities periodically. This procedure has the advantage of insuring control of the work and minimizing error due to constant repetition of the same task. The subtasks included:

- CRD-LRD numbering
- Editing

- ARD and asthma candidate numbering
- Listing of doctors' names and assigning doctor numbers
- Preparing callback lists of non-respondents

The study was concluded, as scheduled, by the end of June.

Study III - Acute Respiratory Disease (ARD)

The purpose of this study is to correlate the incidence of acute respiratory disease with environmental quality. Panels of at least 275 families residing within a two-mile radius of the air monitoring station were recruited to provide the necessary data. The initial selection of candidate families was made from those who completed and returned the School and Family Health Questionnaires during Study I. Final selection by the EPA was based on consideration of such factors as:

- Location of residence
- Presence of children under 12
- Presence of a working telephone
- Length of residence
- Intention to move
- Presence of parents

Recruitment was done by home interviews which were conducted from mid-August through mid-September 1972. An example of the home interview form is appended. At the end of this period, the numbers of interviews shown in Table 3 had been completed.

Table 3. Number of interviews completed by decision of family.

Community	Agreed to Participate	Refused to Participate*	Total	Acceptance Rate
Covina	352	59	411	85%
Garden Grove	374	105	479	78
Thousand Oaks	310	48	358	87

*Category includes a few families in each community who were deemed by CIC to be ineligible to participate because: (1) they planned to move from their communities within eight months, (2) they were unable to communicate in the English language, or (3) their telephones had been removed.

The number of families who agreed to participate may be divided into four priority categories defined as:

- 1a, 2a - Both parents or substitute parents and preschool siblings reside in the home.

- 1a, 2b - Both parents or substitute parents and elementary school siblings reside in the home.

- 1a, 2c - Both parents or substitute parents and high school or college aged siblings reside in the home.

- 1a, 2d - Both parents or substitute parents but no siblings reside in the home.

The numbers of families in each of these categories are given in Table 4:

Table 4. Numbers of families who agreed to participate by priority category.

Community	1a, 2a	1a, 2b	1a, 2c	1a, 2d	Total
Covina	163	162	27	0	352
Garden Grove	163	159	52	0	374
Thousand Oaks	143	145	21	1	310

Interviewing was continued in the order of priority categories until at least 275 1a, 2a and 1a, 2b families in each community agreed to participate. The differences among the totals were primarily a function of (1) the distances between houses and (2), particularly in Thousand Oaks, the variability of the terrain.

The relatively high number of Garden Grove families who refused to participate suggested the existence of a problem and prompted the CIC home interview team leader to investigate. Indeed, a problem was uncovered. One parent, believed to have a child enrolled in Parkview School, was offended by the questions in the School and Family Health Questionnaire concerned with the presence of phlegm. Apparently, this parent was successful in arousing neighborhood antipathy to the CHESS program of sufficient duration to affect participation in the ARD study.

Biweekly telephone interviewing of ARD families began in November 1972. The following table shows the number of families chosen to participate by group designation in each of the CIC CHESS communities. It is noted that only families with both parents or substitute parents and preschool siblings in the home (priority category 1a, 2a) and families with both parents or substitute parents and elementary school siblings in the home (priority category 1a, 2b) were chosen. An example of the ARD telephone survey form is appended.

Table 5. Number of ARD families chosen to participate, by group.

Community	Group A*	Group B*	Total
Covina	163	162	325
Garden Grove	154	157	311
Thousand Oaks	146	142	288

*Groups A and B were chosen at random by the EPA from each community to permit telephoning of half of the families during the first of two successive weeks and the remaining half of the families during the second of two successive weeks.

To date, the cooperation of the ARD families has been excellent. Many have taken time to contact the CIC project office to relate things that they feel may be important. Attrition has been minimal. After nine biweekly periods, over 95 percent of both Group A and Group B families are continuing to participate.

Study IV - Pulmonary Function in Children (PFT)

This study is to correlate the ventilatory performance of elementary school children with environmental quality. Performance is evaluated by measuring forced expiratory volume occurring within 0.75 seconds ($FEV_{0.75}$) using a volume cylinder type spirometer.

Concurrent with Study I, CIC clerical personnel prepared class lists and pulmonary function test report sheets in Garden Grove and Thousand Oaks. In early May 1972, class lists (including only the names of children) were provided by the Covina school district, thus relieving the necessity of asking Covina children for their names at the times of the testing. CIC clerical personnel immediately prepared test report sheets and letters to parents from these lists. The letters were used for purposes of obtaining parental consent.

An intensive training session for pulmonary function team members was held in mid-May by the EPA project officer. Pulmonary function testing in the schools began the day following the training session.

An original plan to use members of local units of Parent-Teacher Associations as testing teams was abandoned when it became clear that it was not possible to obtain a sufficient number of volunteers so late in the school year. Instead, 14 professional field interviewers were employed by CIC to serve in this capacity. Four of these people with appropriate experience were assigned as team leaders. The remaining ten were assigned as team members and alternates. Testing was conducted by four 3-member teams whose membership remained constant throughout the testing period. The numbers of children tested in each community are summarized in Table 6.

Table 6. Numbers of children tested during the first round of PFT.

Community	Enrollment as of May 1972	No. of Children Tested	Percent of Children Tested
Covina	2,148	1,941	90%
Garden Grove	2,225	1,971	89
Thousand Oaks	1,963	1,773	90

The numbers of children tested at each school is given in Table A of the Appendix.

Thus, from mid-May through early June 1972 approximately 5,700 kindergarten through sixth grade children were tested in 13 elementary schools. By the end of the first week, it was found that three teams could easily test all children in a single school of up to 600 enrollment in a single day. The volume of information obtained can be envisioned from a projection of the sample pulmonary function test report shown in Figure 6. Columns 6 through 16 are completed at the time of the tests.

In November 1972 and February 1973, CIC conducted second and third rounds of pulmonary function testing. During each of these rounds approximately 5,500 kindergarten through sixth grade children were tested in the same schools. Although enrollments in these schools ranged from 329 to 707 children, the use of three 3-member teams proved adequate to complete the tests on a schedule of one school per day.

Professional field interviewers were again employed by CIC to serve as pulmonary function team members. Most of these individuals had served in this capacity during the initial round of testing. As in the first round, the membership of the teams remained constant throughout the testing periods and the spriometers were rotated among teams to eliminate systematic variations in the results. Periodic quality checks were made to identify unusual results for immediate investigation. A sample quality check is shown in Figure 7.

The numbers of children tested in each community are summarized in Tables 7 and 8.

PARKDALE - JOHNSON

Figure 6. SAMPLE

PULMONARY FUNCTION TEST REPORT

01 (Mo. (1,2)) 31 (Day (3,4)) 72 (Yr. (5,6)) 12 (Hr. (7,8)) (NEAREST HOUR)

10 (Team (9,10)) 20 (Machine (11,12)) 02 (City (13,14)) 01 (Area (15)) 01 (School (16,17)) 6 (Grade (18)) 03 (Class (19))

CALIBRATION

DIAL	READOUT
1	1.00
2	1.99
3	3.01

TEMPERATURE

BEGIN 24°C.

END 25°C.

SYMPTOM CODE

1 - No Respiratory symptoms
2 - Cough, Cold, Sore Throat
3 - Asthma
4 - Both 2 and 3 Positive

MAXIMUM READING ↓ HEEL HEIGHT ↓

NAME (LAST, FIRST) (20-51)	I.D. (52,53)	CRD-LRD NUMBER (54-60)	TELEPHONE NUMBER (54-60)	DATE OF BIRTH MO. (61,62)	DATE OF BIRTH YR. (63,64)	RACE (65)	SEX (66)	HEIGHT (67-69)	SYMPTOMS (70)	FEV .75 (71-74)	FEV .75 (75-78)	FEV .75	FEV .75	FEV .75	FEV .75	
ALVAREZ, FRANK	01	21014318		04	61	2	1	55.5	1	2.63		2.41	2.58	2.63	✓0.5	
ARDEN, JANE	02	21014276		11	60	3	2	—							—	9
BATES, NANCY	03		477-3817	03	61	3	2	54.0	1	1.86		1.75	1.78	1.86		
BEMIS, GEORGE	04	21014331		02	61	5	1	56.0	2	2.70		1.90	2.61	2.70		
BLOOM, LEOPOLD	05	21014688		12	60	3	1	—							—	8
BOYLE, SARAH	06		443-2111	11	60	5	2	55.0	1	2.48		2.48	2.46	2.31	✓0.5	
CAREY, JAMES	07	NO CRD #	NO PHONE #	02	61	5	1	60.5	4	3.08		2.86	3.08	3.01	✓0.5	
CHIN, MICHAEL	08	21014314		05	61	4	1	55.0	3	2.46		2.41	2.46	2.46		
COOLEY, MARGARET	09	21014321		01	61	5	2	54.5	1	1.91		1.50	1.81	1.91		
CRANE, WILLIAM (R)	10		444-2331	12	60	3	1	—							—	—

Figure 7.

PULMONARY FUNCTION TEST - TEAM QUALITY CHECK
(Eleventh Day - Round One)

Covina — Rowland School — June 1972

Grade	Team 1			Team 2			Team 3			Team 4		
	n	Σx	$\bar{x}$	n	Σx	$\bar{x}$	n	Σx	$\bar{x}$	n	Σx	$\bar{x}$
K							29	28.58	0.99	30	27.74	0.92
1	28	30.33	1.08	27	31.91	1.18	23	28.34	1.23			
2	25	33.42	1.33	26	33.18	1.27	27	35.09	1.29			
3	25	34.29	1.37				28	40.80	1.45	27	39.50	1.46
4				25	41.45	1.65	26	39.03	1.50	27	41.38	1.53
5	35	60.27	1.72	33	57.52	1.74	31	57.20	1.84			
6	33	62.90	1.90	33	66.31	2.00				34	65.36	1.92

n = number of children tested in each classroom.
Σx = sum of the maximum $FEV_{0.75}$ readings for all children tested in each classroom.
$x = \Sigma x/n$ = mean maximum $FEV_{0.75}$ reading for all children tested in each classroom.

Table 7. Numbers of children tested during the second round of PFT.

Community	Enrollment as of Sept. 1972	No. of Children Tested	Percent of Children Tested
Covina	2,218	2,000	90%
Garden Grove	2,048	1,836	90
Thousand Oaks	1,817	1,613	89

Table 8. Numbers of children tested during the third round of PFT.

Community	Enrollment as of Jan. 1973	No. of Children Tested	Percent of Children Tested
Covina	2,252	1,990	88%
Garden Grove	2,071	1,849	89
Thousand Oaks	1,824	1,616	89

The enrollments and numbers of children tested at each school are given in Table B of the Appendix.

In general, the principals, teachers, and other personnel of the schools used for this study were very cooperative. Virtually all of the children tested seemed to enjoy the experience of making the numbers on the digital meter read as high as possible (see Figure 8). Competition for the highest reading evolved (without prompting) in all but the lowest classes.

Study VII - Symptom Variation in Asthmatics

The purpose of the asthma panel study is to correlate the frequency and severity of asthma attacks with environmental quality. Approximately 75 asthmatics were recruited in each of the CHESS communities. This was done by home interviews which were conducted from mid-July through mid-August 1972. An example of the home interview form is appended.

As in the ARD study, initial lists of candidates were developed for each community from responses to the questionnaires distributed in Study I. The numbers of candidates included on these lists are given in Table 9.

Figure 8

Seven-year-old Weathersfield School second-grader Jill Berube takes a deep breath and then blows into the wind machine as Copley International Corporation research, Mrs. Vivian Picker of Garden Grove, watches. Thousand Oaks News-Chronicle photo by Bob Pool.

Table 9. Number of asthmatics identified from those who completed and returned the School and Family Health Questionnaires.

Community	Number of Asthmatics Identified From Questionnaire Responses	No. of Families Involved
Covina	112	85
Garden Grove	144	114
Thousand Oaks	96	73

In addition, CIC obtained names from the referrals of those on the lists and from house-to-house interviews conducted throughout each CHESS community. At the end of the home interview period, the following numbers of interviews had been completed.

Table 10. Number of interviews completed by decision of candidate.

Community	Agreed to Participate	Refused to Participate*	Total	Acceptable Rate
Covina	144	25	169	85%
Garden Grove	175	36	211	83
Thousand Oaks	118	16	134	87

*Category includes a few families in each community who were deemed by CIC to be ineligible to participate because: (1) they planned to move from their communities within eight months, (2) they did not have telephones, or (3) they were under two years of age.

Of those who agreed to participate, 130 candidates in Covina, 156 in Garden Grove, and 113 in Thousand Oaks stated that they had suffered asthma attacks (including symptoms of both shortness of breath and wheezing) within the past 12 months and gave the names of doctors who had treated them for this disease. The remainder of those who agreed to participate stated that they had not suffered asthma attacks within the past 12 months and/or had not been treated by doctors practicing in the Los Angeles Basin.

At the end of the home interview period, the productivity of the methods employed by CIC to locate asthmatics were estimated and compared. The methods differed only to the extent that the persons whose names were taken from the School and Family Health Questionnaires were known to be asthmatics, whereas the persons contacted during the house-to-house canvassing were not. Because of this difference, it was felt that a proper measure of productivity should be based on the number of persons who agreed to participate rather than the number of interviews completed. Table 11 gives the comparison:

Table 11. Comparison of interview methods used in recruiting asthmatics.

Method Employed to Locate Asthmatics	No. of Asthmatics Who Agreed to Participate	No. of Interviewer Days Expended	Productivity of Method (No. Who Agreed Per Interviewer Day)
Covina			
Interview persons whose names were taken from the School and Family Health Questionnaires and their referrals*	110	19.0	5.8
Interview persons by house-to-house canvassing	34	10.0	3.4
Garden Grove			
Interview persons whose names were taken from the School and Family Health Questionnaires and their referrals*	133	25.5	5.2
Interview persons by house-to-house canvassing	42	9.0	4.7
Thousand Oaks			
Interview persons whose names were taken from the School and Family Health Questionnaires and their referrals*	112	24.5	4.6
Interview persons by house-to-house canvassing	6	5.5	1.1

*In this comparison, referrals were combined with persons whose names were taken from the School and Family Health Questionnaires since both were known, or at least thought to be, asthmatics.

Thus, house-to-house canvassing was found to be 59 percent as productive as interviewing persons known to be asthmatics in Covina, 90 percent as productive in Garden Grove, and 24 percent as productive in Thousand Oaks. Again, the differences were primarily a function of (1) the distances between houses and (2) the variability of the terrain.

CIC considers the location of asthmatics by house-to-house canvassing as necessary to supplement the names taken from the School and Family Health Questionnaires and recommends its use in urban communities where meteorological and topographical conditions are not extreme. Indeed, the fact that only 2.2 percent of a given population can be expected to have asthma in varying degrees of severity should not be taken as prima facie evidence that the method could not be productive. For example, the Bureau of the Census lists 3.11 persons per household for the nation as a whole.[2] Based on CIC's experience in the Los Angeles Basin, it is estimated that a single interviewer can contact at least 30 households or 93 persons per day. Besides interviewing an average of two asthmatics (2.2 x 93 = 2.0) per day, numerous referrals could be obtained.

Other methods of obtaining names of asthmatics were considered but were not implemented due to legal restrictions. These methods included soliciting names from hospitals, allergy treatment centers, private practioners, and pharmacists.

Of those who agreed to participate, the numbers of asthmatics selected by the EPA to serve as panelists is shown in Table 12.

Table 12. Numbers of asthmatics chosen as panelists and the numbers of panelists remaining after 19 weeks of participation.

Community	No. of Asthmatics Chosen As Panelists	No. of Panelists Remaining	Percent of Panelists Remaining
Covina	73	56	77%
Garden Grove	76	55	72
Thousand Oaks	78	65	83

Asthma symptoms were recorded by the panelists on special diaries mailed to them each week by CIC. Completed diaries were returned to CIC for editing. An example diary is appended.

[2]Bureau of the Census, 1970 General Population Characteristics, Final Report PC (1)-B1.

Completion of the diaries began in late October 1972. Twenty-one percent of the first week's diaries that were returned to CIC contained one or more errors. This percentage gradually declined to about 6 percent of the nineteenth week's diaries, which was the final week of the contract year. The percentage of usable diaries after any necessary callbacks have been completed has risen from 75 percent to 99 percent of the number of remaining panelists.

The attrition of participants has been greater among asthma panelists than ARD families. This is believed to be partly a matter of the self-administration technique employed for asthma data collection and partly due to the propensity of individuals to avoid having to discuss this chronic problem. The technique is recognized among market research organizations as being generally less productive than an interviewer administration technique such as that adopted for Study III.

AIR MONITORING FACILITIES

Air monitoring in support of the CHESS program in the Los Angeles Basin is the responsibility of the University of California, Riverside, and not of CIC. Nevertheless, it is felt that at least a brief description of the facilities used for this purpose is necessary in order for this volume to present a complete overview of data collection. The information provided below was prepared by UCR.

Equipment

Air monitoring shelters and equipment were furnished by EPA and are identical at all sites. The shelters are air conditioned, prefabricated aluminum structures enclosed by chain link fences. Photographs of the exterior of a typical shelter are given in Figures 9 and 10. On the outside of the shelter are mounted the following measuring devices:

- Hi Vol particulate sampler
- Total and respirable particulate sampler (EPA design)
- Dustfall bucket
- Air intake manifold for samplers inside the shelter

In the interior of the 10' x 12' shelter are the following instruments:

- Bubbler box (for 24 hr. SO_2 and NO_2)
- Sulfur dioxide analyzer
- Ozone analyzer
- PANalyzer (UCR design)
- Nitrogen oxides analyzer
- Strip chart recorders
- Data set

- Combustible gas alarm system
- Acoustic coupler for transmitting data to the EPA, National Environmental Research Center, Research Triangle Park, North Carolina
- Business telephone

A photograph of the interior of a typical shelter is given in Figure 11.

Operation

The air monitoring stations are serviced daily by UCR personnel. Pre-filled bubblers and pre-weighed particulate filters are shipped to California and returned to the EPA for analysis. All gas flow meters are calibrated at the National Environmental Research Center. For quality control purposes, periodic calibrations of continuous analyzers are performed at the stations by EPA personnel.

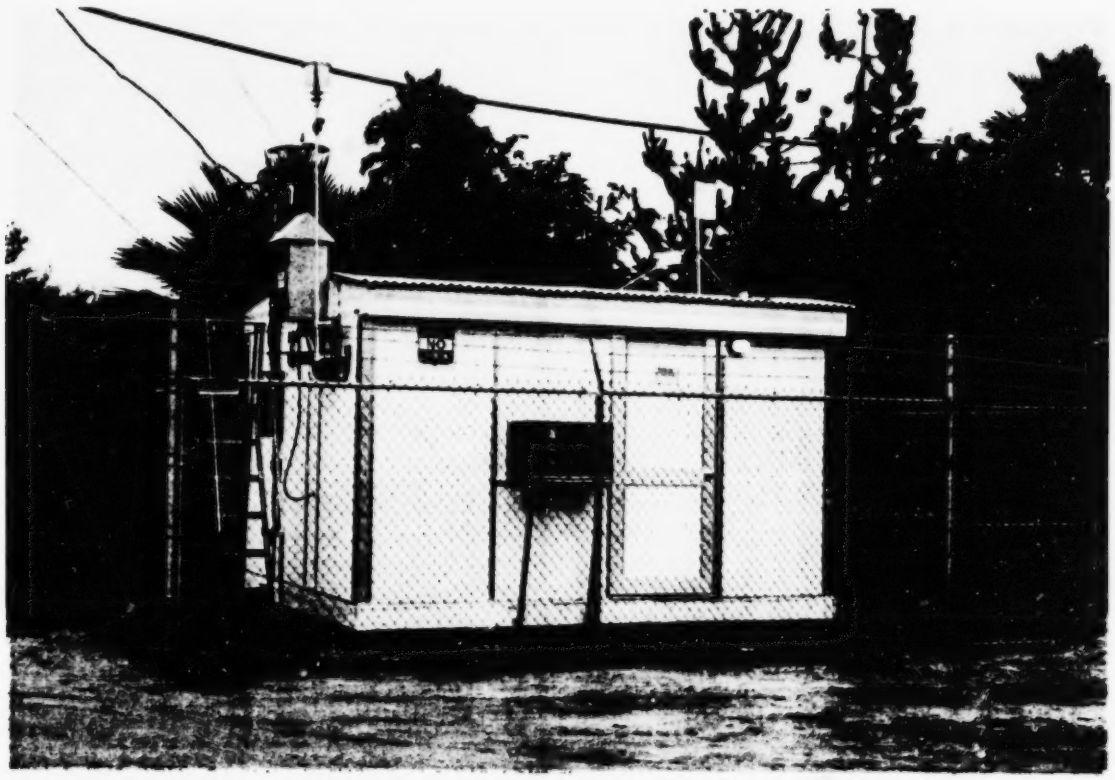
The outputs of the ozone and SO_2 analyzers are recorded on magnetic tape by the data set. The nitrogen oxides analyzers have three outputs: NO, NO_2, and NO_x. They too are recorded on tape. Current plans call for the installation of continuous CO, total hydrocarbons, and PAN monitoring instruments. All outputs except PAN will also be recorded on tape. Real time data can be obtained either from the display console at the National Environmental Research Center or by viewing the digital readouts at the stations. Data can be read from the magnetic tape only at North Carolina. PAN data will be taken manually from a strip chart recorder.

CONCLUDING COMMENTS

Study I (CRD) was completed during the first contract year. Studies III (ARD), IV (PFT), and VII (Symptom Variation in Asthmatics) will continue into the second contract year. Studies II (LRD), V (Incidence of Irritative Symptoms During Acute Episodes), and VI (Pollutant Burden of Trace Metals) will be undertaken during the second contract year.

In addition to gathering LRD information by means of the School and Family Health Questionnaires, Study II will be undertaken to validate the medical history of young children and to compare physicians' diagnostic patterns among the study communities. In the first part of the study, a sample of 200 children in each CHESS community will be selected by the EPA on the basis of information contained in completed and returned questionnaires. The names of these children and their physicians will be sent to Copley International Corporation. CIC will then contact the physicians and obtain permission to transcribe the medical records of these children onto validation forms supplied by the EPA. Medical students will be hired to perform the copy work. The completed validation forms will be reviewed for errors and unclear entries and then forwarded to the EPA.

Figure 9. Air monitoring shelter.



1. Particulate samplers.
2. Air intake manifold.

Source: University of California, Riverside.

Figure 10. Particulate sampling devices.

1. T/RSP particulate sampler.
2. Hi Vol particulate sampler.
3. Dustfall bucket.

Source: University of California, Riverside.

Figure 11. Interior view of shelter.

1. Air intake manifold.
2. Data set.
3. Combustible gas alarm.
4. Strip chart recorder.
5. Ozone analyzer.
6. Nitrogen oxides analyzer.
   Bubbler box (not shown).
   Sulfur dioxide analyzer (not shown).
   PANalyzer (not shown).

Source: University of California, Riverside.

The second part of the study is to survey 100 doctors in each community. In each case the doctors will be asked to define the symptoms of bronchitis as they diagnose it. This procedure will be used to establish the diagnostic customs in each community. The results of the survey will be sent to the EPA.

The basic strategy of Study V is to survey health characteristics of a known sector of the population just after a marked short-term elevation in air pollution. The results of the exposure to the acute episode will be compared to the results of other surveys conducted with the same sample during periods of low or normal air pollution. The sample will be drawn up in advance from ARD study rosters, and the normal ARD telephone interviewers will be briefed on the conduct of the acute episode survey. Actual initiation of the survey will be controlled by EPA declaration of an acute episode. All interviewing will be carried out on the day following the EPA alert.

Under Study VI, specimens of hair, vacuum cleaner dust, and tap water will be collected from a sample of ARD families in the CHESS communities. The tap water and dust samples will be collected by personal visits to the homes after appointments have been scheduled. Hair samples will be collected by participants during a normal haircut and mailed to CIC.

CIC will arrange with local hospital departments of obstetrics to collect 25 maternal-fetal sets in each community. In doing so, CIC will assist the hospitals in selecting suitable patients and eliciting their cooperation. CIC will supply the hospitals with Mother's and Hospital Information questionnaires for completion after deliveries and prenumbered labels and containers for tissue collection. CIC will arrange for the preparation and transportation of the 25 tissue sets from each community to the EPA.

The first of two special tasks to be undertaken during the second contract year involves the preparation of magnetic cassette tapes to instruct interviewers in speaking to classes of elementary school children preparatory to pulmonary function testing, recruiting and administering the diaries of asthma panelists, and eliciting cooperation of expectant mothers in preparation for the collection of maternal-fetal sets. The second specific task involves editing the EPA procedures used in the collection and analysis of CHESS program data. Emphasis here will be directed at uniformity of terminology and general clarity of the statements of purpose and step-by-step instructions. Printing of a limited number of the edited procedures will follow EPA approval of any revisions made by CIC.

APPENDIX

Table A.

NUMBERS OF SCHOOL AND FAMILY HEALTH QUESTIONNAIRES DISTRIBUTED (STUDY I-CRD) AND NUMBERS OF CHILDREN TESTED (STUDY IV-PFT), PER SCHOOL, IN EACH CHESS COMMUNITY

Covina

Name of School	Enrollment as of Jan. 1972	No. of Questionnaires Distributed	Percent of Questionnaires Returned	Enrollment as of May 1972	No. of Children Tested 1st Round	Percent of Children Tested 1st Round
Cienega	334	217	91%	334	318	95%
Griswold	397	258	87	397	352	89
Manzanita	454	295	93	454	375	83
Rowland	606	393	79	606	572	94
Sunkist*	357	232	87	357	324	91
Totals	2,148	1,395	87%	2,148	1,941	90%

Garden Grove

Name of School	Enrollment as of Jan. 1972	No. of Questionnaires Distributed	Percent of Questionnaires Returned	Enrollment as of May 1972	No. of Children Tested 1st Round	Percent of Children Tested 1st Round
Crosby*	499	434	81%	507	475	94%
Mark Twain**	309	263	87	384	287	75
Parkview	497	294	78	509	465	91
Stanley	488	294	81	426	387	91
Violette	354	271	86	399	357	90
Totals	2,147	1,456	82%	2,225	1,971	89%

Thousand Oaks

Name of School	Enrollment as of Jan. 1972	No. of Questionnaires Distributed	Percent of Questionnaires Returned	Enrollment as of May 1972	No. of Children Tested 1st Round	Percent of Children Tested 1st Round
Glenwood*	621	396	82%	641	559	87%
Meadows	753	468	84	750	690	92
Weathersfield	576	355	82	572	524	92
Totals	1,950	1,219	83%	1,963	1,773	90%

*Site of air monitoring unit maintained by University of California, Riverside.
**This school has several special education classes which were not tested.

Table B.

NUMBER OF CHILDREN TESTED (STUDY IV - PFT), PER SCHOOL, IN EACH CHESS COMMUNITY

Covina

Name of School	Enrollment as of Sept. 1972	No. of Children Tested 2nd Round	Percent of Children Tested 2nd Round	Enrollment as of Jan. 1973	No. of Children Tested 3rd Round	Percent of Children Tested 3rd Round
Cienega	527	498	94.5%	518	470	90.7%
Griswold	408	349	85.5	418	350	83.7
Manzanita	309	282	91.3	329	299	90.9
Rowland	598	536	89.6	611	530	86.7
Sunkist*	376	335	89.1	376	341	90.7
Totals	2,218	2,000	90.2%	2,252	1,990	88.4%

Garden Grove

Name of School	Enrollment as of Sept. 1972	No. of Children Tested 2nd Round	Percent of Children Tested 2nd Round	Enrollment as of Jan. 1973	No. of Children Tested 3rd Round	Percent of Children Tested 3rd Round
Crosby*	447	434	97.1%	456	399	87.5%
Mark Twain**	352	271	77.0	371	297	80.1
Parkview	469	438	93.4	484	455	94.0
Stanley	366	317	86.6	354	326	92.1
Violette	414	376	90.8	406	372	91.6
Totals	2,048	1,836	89.6%	2,071	1,849	89.3%

Thousand Oaks

Name of School	Enrollment as of Sept. 1972	No. of Children Tested 2nd Round	Percent of Children Tested 2nd Round	Enrollment as of Jan. 1973	No. of Children Tested 3rd Round	Percent of Children Tested 3rd Round
Glenwood*	574	503	87.6%	566	513	90.6%
Meadows	691	648	93.8	707	657	92.9
Weathersfield	552	462	83.7	551	446	80.9
Totals	1,817	1,613	88.8%	1,824	1,616	88.6%

*Site of air monitoring unit maintained by University of California, Riverside.

**This school has several special education classes which were not tested.

OMB 158-R0019
EXPIRES 8/31/73

044630

SCHOOL AND FAMILY HEALTH QUESTIONNAIRE

NAME OF HEAD OF HOUSEHOLD _____
FIRST NAME LAST NAME
(9-28)

STREET _____
(24-49)

CITY _____ ZIP CODE _____
(50-64) (65-69)

TELEPHONE _____ _____
(70-76) (77-78)

THE INFORMATION REQUESTED IN THIS QUESTIONNAIRE WILL BE HELD IN STRICT CONFIDENCE. RESULTS WILL BE SUMMARIZED FOR GROUPS OF PERSONS. NO INFORMATION ON INDIVIDUAL RESPONSES WILL BE RELEASED.

0 1
(79-80)

DC 9639 OPTICAL SCANNING CORPORATION

INSTRUCTIONS FOR ANSWERING SCHOOL AND FAMILY HEALTH QUESTIONNAIRE

1. READ QUESTIONS CAREFULLY BEFORE ANSWERING.

2. SELECT THE ANSWERS WHICH SEEM MOST APPROPRIATE, AND BLACKEN COMPLETELY THOSE BOXES WHICH CORRESPOND WITH THEM. (SEE ILLUSTRATION BELOW.)

	MOTHER (OR FEMALE GUARDIAN)		FATHER (OR MALE GUARDIAN)	
DO YOU USUALLY COUGH DURING THE DAY OR NIGHT IN WINTER? (DO NOT COUNT AN OCCASIONAL COUGH.)	▮ YES	NO	YES	▮ NO

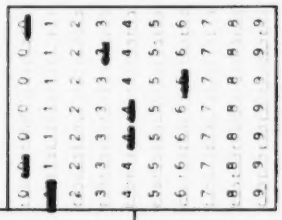
3. USE A SOFT LEAD PENCIL. DO NOT USE INK.

4. ANY REMARKS CAN BE WRITTEN ON THE BACK OF THE PAGES. ERASE ANY MISTAKES COMPLETELY.

DC 9640

OPTICAL SCANNING FORMAT by OPTICAL SCANNING CORPORATION © MCMXXXX

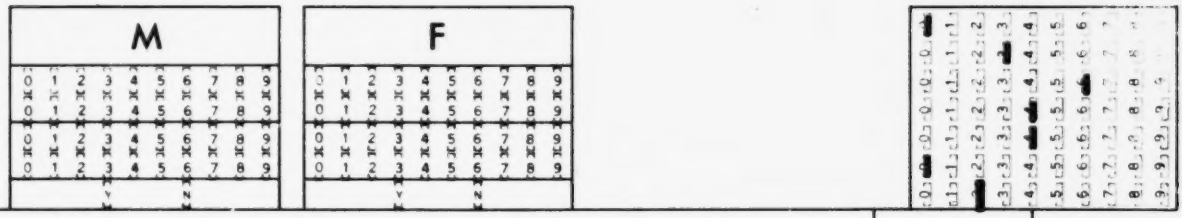
I HEALTH QUESTIONS ABOUT THE FATHER AND MOTHER



NOTE: THE QUESTIONS IN THIS SECTION ARE TO BE ANSWERED FOR BOTH PARENTS BY THE MOTHER OR FEMALE GUARDIAN. ANSWER THE QUESTIONS IN THIS SECTION ONLY FOR PARENTS (OR GUARDIANS) LIVING IN THE HOME.

	MOTHER (OR FEMALE GUARDIAN)	FATHER (OR MALE GUARDIAN)
1. DO YOU USUALLY COUGH FIRST THING IN THE MORNING IN WINTER? (COUNT TWO OR MORE COUGHS UPON ARISING, OR WHEN YOU FIRST GO OUT OF DOORS, OR WHEN YOU SMOKE THE FIRST CIGARETTE OF THE DAY IF YOU ARE A SMOKER. DO NOT COUNT CLEARING OF THROAT.)	☐ YES ☐ NO	☐ YES ☐ NO
IF YOU ANSWERED "YES" TO QUESTION 1 PLEASE ANSWER QUESTION 2 .		
2. DO YOU COUGH LIKE THIS ON MOST DAYS OR NIGHTS FOR AS MUCH AS THREE MONTHS EACH YEAR?	☐ YES ☐ NO	☐ YES ☐ NO
3. DO YOU USUALLY COUGH DURING THE DAY OR NIGHT IN WINTER? (DO NOT COUNT AN OCCASIONAL COUGH) .	☐ YES ☐ NO	☐ YES ☐ NO
IF YOU ANSWERED "YES" TO QUESTION 3 PLEASE ANSWER QUESTION 4.		
4. DO YOU COUGH LIKE THIS ON MOST DAYS OR NIGHTS FOR AS MUCH AS THREE MONTHS EACH YEAR?	☐ YES ☐ NO	☐ YES ☐ NO
5. DO YOU USUALLY BRING UP PHLEGM (THICK FLUID) FROM YOUR CHEST FIRST THING IN THE MORNING IN WINTER? (COUNT PHLEGM WHETHER SWALLOWED OR EXPELLED, UPON ARISING, OR WHEN YOU FIRST GO OUT OF DOORS, OR WHEN YOU SMOKE THE FIRST CIGARETTE OF THE DAY IF YOU ARE A SMOKER.) (DO NOT COUNT PHLEGM FROM THE NOSE.)	☐ YES ☐ NO	☐ YES ☐ NO
IF YOU ANSWERED "YES" TO QUESTION 5 PLEASE ANSWER QUESTION 6.		
6. DO YOU BRING UP PHLEGM LIKE THIS ON MOST DAYS OR NIGHTS FOR AS MUCH AS THREE MONTHS EACH YEAR?	☐ YES ☐ NO	☐ YES ☐ NO
7. DO YOU USUALLY BRING UP PHLEGM FROM YOUR CHEST DURING THE DAY OR NIGHT IN WINTER?	☐ YES ☐ NO	☐ YES ☐ NO
IF YOU ANSWERED "YES" TO QUESTION 7 PLEASE ANSWER QUESTION 8.		
8. DO YOU BRING UP PHLEGM LIKE THIS ON MOST DAYS OR NIGHTS FOR AS MUCH AS THREE MONTHS EACH YEAR?	☐ YES ☐ NO	☐ YES ☐ NO
9. IN THE PAST THREE YEARS, HAVE YOU HAD A PERIOD OF COUGH AND PHLEGM LASTING FOR THREE WEEKS OR MORE? (ALL PERSONS SHOULD ANSWER THIS QUESTION.) IF YOU USUALLY HAVE COUGH OR PHLEGM, THE QUESTION REFERS TO PERIODS OF MORE THAN USUAL COUGH OR PHLEGM.		
NO	☐	☐
YES, 1 PERIOD	☐	☐
YES, 2 OR MORE PERIODS	☐	☐

DO NOT MARK IN THIS SPACE



	MOTHER (OR FEMALE GUARDIAN)	FATHER (OR MALE GUARDIAN)
10. DO YOU GET SHORT OF BREATH WALKING ON LEVEL GROUND AT AN ORDINARY PACE?	YES NO	YES NO
11. DO YOU SMOKE A PIPE OR CIGAR?	YES NO	YES NO
12. HAVE YOU EVER SMOKED AS MANY AS FIVE PACKS OF CIGARETTES, THAT IS, AS MANY AS 100 CIGARETTES, DURING YOUR ENTIRE LIFE?	YES NO	YES NO
13. DO YOU NOW SMOKE CIGARETTES?	YES NO	YES NO
14. IF YOU ARE A CURRENT OR AN EX-CIGARETTE SMOKER, HOW MANY CIGARETTES DO (DID) YOU SMOKE PER DAY?		
LESS THAN ½ PACK PER DAY (1-5 CIGARETTES PER DAY)		
ABOUT ½ PACK PER DAY (6-14 CIGARETTES PER DAY)		
ABOUT 1 PACK PER DAY (15-25 CIGARETTES PER DAY)		
ABOUT 1½ PACKS PER DAY (26-34 CIGARETTES PER DAY)		
ABOUT 2 PACKS PER DAY (35 OR MORE CIGARETTES PER DAY)		
15. IF YOU ARE A CURRENT OR AN EX-CIGARETTE SMOKER, HOW OLD WERE YOU WHEN YOU FIRST STARTED SMOKING?	YEARS	YEARS
16. IF YOU ARE AN EX-CIGARETTE SMOKER, HOW OLD WERE YOU WHEN YOU LAST GAVE UP SMOKING?	YEARS	YEARS
17. AT YOUR JOB ARE YOU NOW OR HAVE YOU BEEN FREQUENTLY EXPOSED TO IRRITATING SMOKE, DUST, OR FUMES?	YES NO	YES NO
IF YOU ANSWERED "NO" TO QUESTION 17 SKIP THE NEXT 2 QUESTIONS BELOW.		
18. WHAT KIND OF IRRITANT WERE YOU EXPOSED TO: (FOR EXAMPLE: COAL DUST, CUTTING OILS, ASBESTOS, MINE DUST, SMELTER FUMES, RAW COTTON DUST, FOUNDRY DUST)		
19. HOW LONG WERE YOU EXPOSED?		
LESS THAN 1 YEAR		
1 TO 5 YEARS		
6 TO 10 YEARS		
MORE THAN 10 YEARS		

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II QUESTIONS ABOUT THE HEALTH OF CHILDREN 12 YEARS OR YOUNGER

WRITE AT THE HEAD OF EACH COLUMN THE NAME OF EACH CHILD 12 YEARS OF AGE OR YOUNGER.

THEN, IN EACH CHILD'S COLUMN MARK ONE BOX TO ANSWER EACH OF THE FOLLOWING QUESTIONS.

DO NOT MARK IN THIS SPACE

	NAME OF 1st CHILD	NAME OF 2nd CHILD	NAME OF 3rd CHILD	NAME OF 4th CHILD
1. HAS YOUR CHILD BEEN TREATED BY A DOCTOR FOR PNEUMONIA DURING THE LAST THREE YEARS?	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE
2. HAS YOUR CHILD BEEN TREATED BY A DOCTOR FOR AN ATTACK OF CROUP DURING THE LAST THREE YEARS?	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE
3. HAS YOUR CHILD BEEN TREATED BY A DOCTOR FOR AN ATTACK OF BRONCHITIS DURING THE LAST THREE YEARS?	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE
4. HAS YOUR CHILD BEEN TREATED BY A DOCTOR DURING THE PAST THREE YEARS FOR ANY CHEST INFECTION OTHER THAN THE ABOVE THREE?	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE
5. HAS YOUR CHILD BEEN IN THE HOSPITAL FOR ONE OF THE ILLNESSES MENTIONED IN QUESTIONS 1, 2, OR 3 ABOVE DURING THE LAST THREE YEARS?	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE	NO YES, ONCE YES, TWICE YES, MORE THAN TWICE
6. WHAT IS THE FULL NAME AND ADDRESS OF THE DOCTOR WHO TAKES CARE OF YOUR CHILD OR, IF YOU TAKE YOUR CHILD TO A CLINIC FOR MEDICAL CARE, WHAT IS THE NAME AND ADDRESS OF THE CLINIC?				

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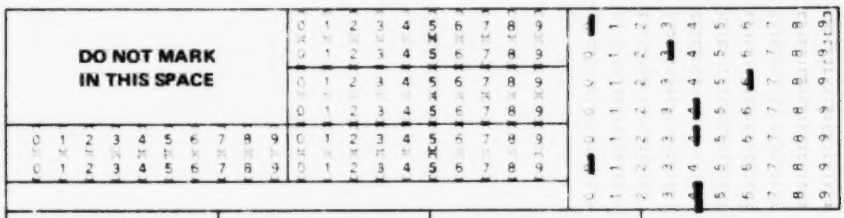
IF YOU HAVE MORE THAN 4 CHILDREN 12 YEARS OR YOUNGER CONTINUE ON THIS PAGE.

PLEASE CHECK BOX BELOW IF THERE ARE MORE THAN 8 CHILDREN 12 YEARS OF AGE OR YOUNGER. ☐

DO NOT MARK IN THIS SPACE



	NAME OF 5th CHILD	NAME OF 6th CHILD	NAME OF 7th CHILD	NAME OF 8th CHILD
1. HAS YOUR CHILD BEEN TREATED BY A DOCTOR FOR PNEUMONIA DURING THE LAST THREE YEARS?	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE
2. HAS YOUR CHILD BEEN TREATED BY A DOCTOR FOR AN ATTACK OF CROUP DURING THE LAST THREE YEARS?	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE
3. HAS YOUR CHILD BEEN TREATED BY A DOCTOR FOR AN ATTACK OF BRONCHITIS DURING THE LAST THREE YEARS?	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE
4. HAS YOUR CHILD BEEN TREATED BY A DOCTOR DURING THE PAST THREE YEARS FOR ANY CHEST INFECTION OTHER THAN THE ABOVE THREE?	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE
5. HAS YOUR CHILD BEEN IN THE HOSPITAL FOR ONE OF THE ILLNESSES MENTIONED IN QUESTIONS 1, 2, OR 3 ABOVE DURING THE LAST THREE YEARS?	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE	☐ NO ☐ YES, ONCE ☐ YES, TWICE ☐ YES, MORE THAN TWICE
6. WHAT IS THE FULL NAME AND ADDRESS OF THE DOCTOR WHO TAKES CARE OF YOUR CHILD OR, IF YOU TAKE YOUR CHILD TO A CLINIC FOR MEDICAL CARE, WHAT IS THE NAME AND ADDRESS OF THE CLINIC?	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____

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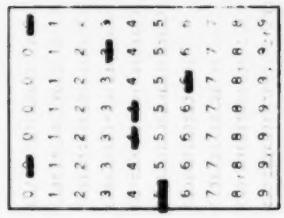
III GENERAL QUESTIONS ABOUT THE HOUSEHOLD



1. WHAT EDUCATIONAL LEVEL HAS BEEN COMPLETED BY THE HEAD OF THE HOUSEHOLD? (MARK ONE BOX ONLY)

- ELEMENTARY SCHOOL
- PART OF HIGH SCHOOL
- HIGH SCHOOL GRADUATE
- PART OF COLLEGE
- COLLEGE GRADUATE
- GRADUATE SCHOOL INCLUDING ADVANCED AND PROFESSIONAL DEGREES
- TRADE, TECHNICAL, OR BUSINESS SCHOOL BEYOND HIGH SCHOOL

2. WHAT IS THE RACE OF THE FAMILY?

- INDIAN
- MEXICAN AMERICAN OR SPANISH AMERICAN
- NEGRO
- ORIENTAL
- WHITE
- OTHER, INCLUDING MIXED

3. HOW LONG HAS THE FAMILY LIVED IN YOUR PRESENT CITY OR TOWN?

- LESS THAN 1 YEAR
- 1 YEAR
- 2 YEARS
- 3 YEARS
- 4 YEARS
- 5 YEARS
- 6 YEARS
- 7 YEARS
- 8 YEARS
- 9 YEARS
- 10 YEARS
- 11 YEARS
- 12 YEARS OR MORE

4. HOW MANY ROOMS ARE THERE IN YOUR LIVING QUARTERS? (DO NOT COUNT BATHROOMS, PORCHES, BALCONIES, FOYERS, HALLS OR HALF ROOMS. MARK ONE BOX ONLY).

- ONE
- TWO
- THREE
- FOUR
- FIVE
- SIX
- SEVEN
- EIGHT
- NINE OR MORE

5. DO YOU PLAN TO MOVE WITHIN THE NEXT YEAR? ☐ YES ☐ NO

6. DO YOU ORDINARILY USE A GAS STOVE FOR COOKING IN YOUR HOME? ☐ YES ☐ NO

7. DO YOU USE A GAS SPACE HEATER IN YOUR HOME? ☐ YES ☐ NO

IV CENSUS OF HOUSEHOLD

044630

(WRITE IN THE COLUMN BELOW THE FIRST AND MIDDLE NAME OF EACH PERSON LIVING IN THE HOUSEHOLD. WRITE LAST NAME FOR PERSONS WHOSE LAST NAME IS DIFFERENT FROM THAT ON THE COVER OF THE QUESTIONNAIRE.)

NAME (9-31)	MARK THE APPROPRIATE BOX OR BOXES FOR EACH PERSON								
	(36-37) AGE		(38) SEX		(39) POSITION IN HOUSEHOLD				(79-80)
	YEAR OF BIRTH	AGE IN YEARS AT LAST BIRTHDAY	MALE 1	FEMALE 2	FATHER OR MALE GUARDIAN 1	MOTHER OR FEMALE GUARDIAN 2	CHILD 3	OTHER 4	
01									02
02									03
03									04
04									05
05									06
06									07
07									08
08									09
09									10
10									11
11									12
12									13
13									14
14									15
15									16

DC9646

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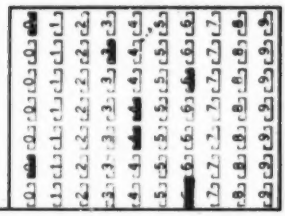
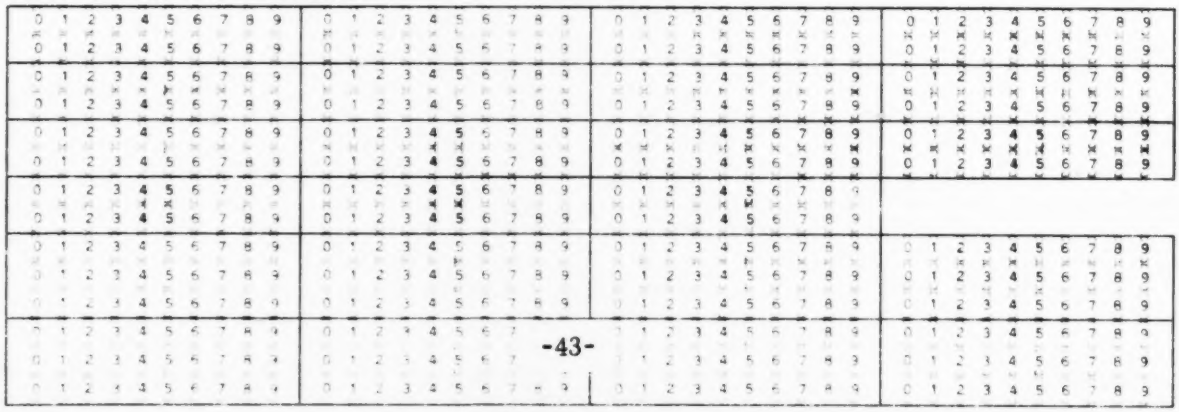
WRITE IN THE COLUMN BELOW THE FIRST NAME OF EACH PERSON IN THE HOUSEHOLD WHO HAS ASTHMA, CHRONIC HEART DISEASE AND/OR CHRONIC LUNG DISEASE, THAT HAS BEEN DIAGNOSED BY A DOCTOR. MARK APPROPRIATE BOX OR BOXES FOR EACH PERSON.



NAME	CHRONIC HEART DISEASE	CHRONIC LUNG DISEASE	ASTHMA	IF THIS PERSON HAS ASTHMA, HAS THIS ASTHMA BEEN ACTIVE IN THE PAST TWO YEARS? YES	NO
01	☐	☐	☐	☐	☐
02	☐	☐	☐	☐	☐
03	☐	☐	☐	☐	☐
04	☐	☐	☐	☐	☐
05	☐	☐	☐	☐	☐
06	☐	☐	☐	☐	☐
07	☐	☐	☐	☐	☐
08	☐	☐	☐	☐	☐
09	☐	☐	☐	☐	☐
10	☐	☐	☐	☐	☐
11	☐	☐	☐	☐	☐
12	☐	☐	☐	☐	☐
13	☐	☐	☐	☐	☐
14	☐	☐	☐	☐	☐
15	☐	☐	☐	☐	☐

DO NOT MARK IN THIS SPACE



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REPORT OF ARD PANEL INTERVIEW

CITY FAMILY NUMBER

FAMILY NAME

ADDRESS ZIP

TELEPHONE

RACE

DO NOT MARK IN THIS COLUMN

1. DO YOU HAVE DEFINITE PLANS TO MOVE FROM THIS CITY OR A DISTANCE GREATER THAN 5 MILES IN THE NEXT YEAR ? ☐ YES ☐ NO

2. WILL YOUR FAMILY PARTICIPATE IN THIS STUDY ? ☐ YES ☐ NO

IF THE ANSWER IS NO TO QUESTION 1 AND YES TO QUESTION 2, ASK QUESTION 3 AND 4.

3. WHAT IS THE APPROPRIATE TIME OF DAY FOR YOU TO BE CALLED ON THE PHONE?

LIST PHONE ONLY IF DIFFERENT FROM ABOVE.

_____ AM/PM to _____ AM/PM phone _____

_____ AM/PM to _____ AM/PM phone _____

4. ARE THERE ANY DAYS (MONDAY—FRIDAY) DURING WHICH YOU CANNOT BE REACHED AT HOME BY PHONE ? (THIS QUESTION REFERS TO THE MOTHER OR HER EQUIVALENT) ☐ YES ☐ NO

IF YES, MARK DAY(S) YOU CANNOT BE REACHED. ☐ MON ☐ TUE ☐ WED ☐ THU ☐ FRI

NAME OF INTERVIEWER _____

DATE OF INTERVIEW _____

5. WHAT DOCTOR (S) TREAT (S) YOUR FAMILY ?

FAMILY MEMBER	AGE	SEX	DOCTOR

ARD TELEPHONE QUESTIONNAIRE

1892

NAME: PHONE:	NUMBER:	REMARKS:
ADDRESS:	PERIOD:	

Interviewer

DATE CALLED: Mo. Day

CENSUS LIST	Has there been any new illness?	Fever?	Respiratory Illness: Lower—chest cold croup bronchitis pneumonia asthma	Respiratory Illness: Upper—head cold sinus sore throat runny nose	How many days were normal activities restricted?	Was doctor consulted?	Did doctor say ear was infected?	Week of onset	Day of onset
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S
	Y N	Y N	Y N	Y N	0 1 2 3 4 5 6 7 8 9	Y N	Y N	1 2	S M T W T F S

NCS Trans-Optic F1483-54321

ASTHMA PANEL QUESTIONNAIRE

(Card 1)

1. I.D. # _____
COL (1-8)

2. Asthma Subject's Name _____ _____ _____
COL (9-40) (Last) (First) (Initial)

3. Subject's Address _____
COL (41-63) (House Number) (Street)

_____
(City) (State) (Zip)

4. Subject's Telephone Number _____
COL (64-70)

5. Other Code # _____
COL (71-78)

COL (79-80) 0 1

6. If respondent is other than asthma subject, enter:

_____
(Respondent's Name) (Relationship to subject)

7a. Subject plans to move within the year ☐ Yes ☐ No

7b. If yes, when?_____ and where? _____

8a. Subject agrees to participate in panel ☐ Yes ☐ No

8b. If no, enter reason for refusal _____

9. Interviewer's Name _____

10. Date of Interview ☐☐ ☐☐ ☐☐
Mo. Day Yr.

(Card 2)

I. IDENTIFYING INFORMATION

1. Birth Date

_____ _____ _____
(Month) (Day) (Year)

COL (9-14)

Enter two numbers each for the month, day, and year on the lines above. For example: For birthdate June 5, 1950, enter 06 05 50.

2. Sex: COL (15)

1 ☐ Male
2 ☐ Female

3. Race or ethnic group COL (16)

1 ☐ Indian
2 ☐ Mexican-American or Spanish-American
3 ☐ Black
4 ☐ Oriental
5 ☐ White
6 ☐ Other _____
(Please specify)

II. HEALTH HISTORY

1. How old were you when your asthma first began?

_____ COL (17-18)
(Enter age in years)

2. About how many asthma attacks have you had within the past year?

_____ COL (19-21)
(Enter number of attacks)

3. When you have an asthma attack do you usually have:

a. Shortness of breath?	1 ☐ Yes	2 ☐ No	COL (22)
b. Wheezing in the chest?	1 ☐ Yes	2 ☐ No	COL (23)
c. Fever?	1 ☐ Yes	2 ☐ No	COL (24)
d. Increased sputum or phlegm production?	1 ☐ Yes	2 ☐ No	COL (25)

4a. Do you use medicine (pills, liquid, inhaler or suppositories) when you have, or are about to have, an asthma attack?	1 ☐ Yes 2 ☐ No	COL (26)
4b. If yes, please specify medicine(s) used.	_____	
5. Do your asthma attacks ever get severe enough to keep you from your normal activities or from sleeping at night?	1 ☐ Yes 2 ☐ No	COL (27)
6. Do you have asthma attacks in:		
Winter (Jan.-Feb.-Mar.)	1 ☐ Yes 2 ☐ No	COL (28)
Spring (Apr.-May-June)	1 ☐ Yes 2 ☐ No	COL (29)
Summer (Jul.-Aug.-Sept.)	1 ☐ Yes 2 ☐ No	COL (30)
Fall (Oct.-Nov.-Dec.)	1 ☐ Yes 2 ☐ No	COL (31)
7. At your job are there fumes or dusts that tend to bring on asthma attacks?	1 ☐ Yes 2 ☐ No	COL (32)
8. Do you tend to get asthma attacks:		
a. When it gets unusually cold outside?	1 ☐ Yes 2 ☐ No	COL (33)
b. When you get respiratory infections, like colds?	1 ☐ Yes 2 ☐ No	COL (34)
c. When you get upset?	1 ☐ Yes 2 ☐ No	COL (35)
d. When you eat certain foods?	1 ☐ Yes 2 ☐ No	COL (36)
e. When you are near certain animals?	1 ☐ Yes 2 ☐ No	COL (37)
9. Do you have hay fever?	1 ☐ Yes 2 ☐ No	COL (38)
10. What is the name and address of the doctor who has been treating you for your asthma?	_____	COL (39-41)

11. Have you smoked a total of more than 100 cigarettes during your entire life?	1 ☐ Yes 2 ☐ No	COL (42)
11a. Do you smoke cigarettes now?	1 ☐ Yes 2 ☐ No	COL (43)
11b. If you are a current or an ex-cigarette smoker, how many cigarettes do (did) you smoke each day? (Check only 1 answer).		
Less than ½ pack per day (1–5 cigarettes)	1 ☐	COL (44)
About ½ pack per day (6–14 cigarettes)	2 ☐	
About 1 pack per day (15–25 cigarettes)	3 ☐	
About 1½ packs per day (26–34 cigarettes)	4 ☐	
About 2 or more packs per day (35 or more cigarettes)	5 ☐	
11c. How many years have you smoked cigarettes (if you now smoke) or did you smoke (if you are an ex-smoker)?	_____ (Years)	COL (45-46)
11d. If you are an ex-cigarette smoker, when did you last give up smoking?		
Within the past 6 months	1 ☐	COL (47)
More than 6 months ago	2 ☐	
12. Do you currently smoke cigars or a pipe?	1 ☐ Yes 2 ☐ No	COL (48)
13. How many other people in your home smoke? (cigarettes, cigars or a pipe)	_____	COL (49)

III. GENERAL HISTORY

1. How many rooms are there in your living quarters? (Do not count bathrooms, porches, balconies, foyers, halls, or halfrooms.)

1 ☐ One
2 ☐ Two
3 ☐ Three
4 ☐ Four
5 ☐ Five
6 ☐ Six
7 ☐ Seven
8 ☐ Eight
9 ☐ Nine or more

COL (50)

2. How many people live in your household?

01 ☐ One
02 ☐ Two
03 ☐ Three
04 ☐ Four
05 ☐ Five
06 ☐ Six
07 ☐ Seven
08 ☐ Eight
09 ☐ Nine
10 ☐ Ten
11 ☐ Eleven
12 ☐ Twelve or more

COL (51-52)

3. What educational level did the head of your household complete?

1 ☐ Elementary school
2 ☐ Part of high school
3 ☐ High school graduate
4 ☐ Part of college
5 ☐ College graduate
6 ☐ Graduate school
7 ☐ Other _____ (Please specify)

COL (53)

COL (79-80) 0 2

NAME _____ I.D. NUMBER _____ WEEK _____

OMB 158-R0019
Expires 8/31/73

1990

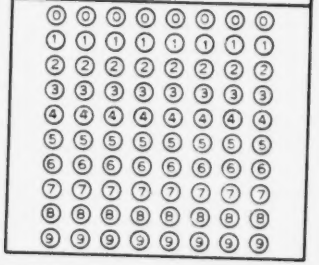
I. PLEASE ANSWER FOR EACH DAY OF THE WEEK:

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1. DID YOU HAVE AN ASTHMA EPISODE TODAY?	○ NO ○ YES, ONE ○ YES, TWO OR MORE	○ NO ○ YES, ONE ○ YES, TWO OR MORE	○ NO ○ YES, ONE ○ YES, TWO OR MORE	○ NO ○ YES, ONE ○ YES, TWO OR MORE	○ NO ○ YES, ONE ○ YES, TWO OR MORE	○ NO ○ YES, ONE ○ YES, TWO OR MORE	○ NO ○ YES, ONE ○ YES, TWO OR MORE
2. WERE YOU OUT OF YOUR HOME NEIGHBORHOOD ALL DAY TODAY (24 HOURS)?	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES

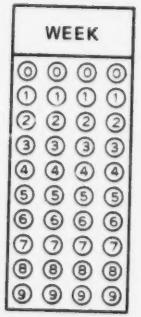
II. IF YOU DID HAVE AN ASTHMA EPISODE, PLEASE ANSWER THE QUESTIONS BELOW:

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
3. AT WHAT TIME DID THE FIRST EPISODE BEGIN?	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT	○ MIDNIGHT TO 6 A.M. ○ 6 A.M. TO NOON ○ NOON TO 6 P.M. ○ 6 P.M. TO MIDNIGHT
4. WERE YOU IN YOUR HOME NEIGHBORHOOD WHEN THE FIRST EPISODE BEGAN?	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES
5. WAS THE EPISODE (OR EPISODES) SEVERE ENOUGH TO KEEP YOU FROM YOUR NORMAL ACTIVITY OR FROM SLEEPING AT NIGHT?	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES	○ NO ○ YES

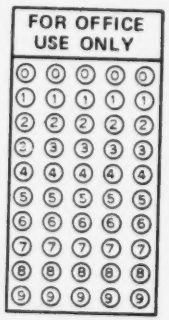
I.D. NUMBER



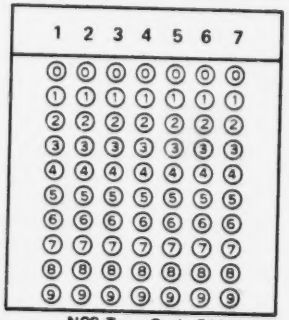
WEEK



FOR OFFICE USE ONLY



1 2 3 4 5 6 7



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